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National Systematics Laboratory Report for Calendar Year 1993

Washington, D.C.

August 1994

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

ANNUAL REPORT
National Systematics Laboratory
Calendar Year 1993

Washington, D.C.
August 1994

U.S. DEPARTMENT OF COMMERCE
Ronald H. Brown, Secretary

National Oceanic and Atmospheric Administration
D. James Baker, Under Secretary for Oceans and Atmosphere

National Marine Fisheries Service
Rolland A. Schmitten, Assistant Administrator for Fisheries

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1993 HIGHLIGHTS

- Monograph on western Atlantic mudshrimps (*Upogebia*: Upogebiidae) published
- Paper on the biology of tautog published
- New species of halfbeak described from the United States
- New species of cutlassfish described from western Atlantic
- 50 year bibliography of Systematics Lab publications issued
- Geographic and taxonomic review of the large squid *Taningia* published
- 70% of the species accounts drafted for the revision of Bigelow & Schroeders' Fishes of the Gulf of Maine
- Tongan Islands coral reef fish biodiversity surveyed
- NSL staff participated in several biodiversity workshops

MISSION

The National Systematics Laboratory is the primary element of NOAA involved in defining and characterizing marine biodiversity. We conduct taxonomic research on marine organisms of economic and ecological value to the United States. In addition to providing taxonomic information on species that are commercially important, scientific studies conducted by Systematics Laboratory personnel comprise significant contributions to the study of marine biodiversity by describing and naming new species as well as revising existing names and descriptions based on new information. Because many important species are widespread or migratory, our research is worldwide.

Accurate taxonomic information is the critical first step in recognizing individual species. This information provides an understanding of the diversity of marine communities and is the necessary basis for proper management of our nation's living marine resources. Without a clear understanding of what individual species look like, where they are found, and what their names are, we cannot collect accurate statistics, develop reasonable national fishing and conservation regulations, set catch limits, or begin to understand the complexity and diversity of marine communities.

The Systematics Laboratory is actively involved in studying the taxonomy and biodiversity of fishes, crustaceans, and squids. We have a permanent staff of four systematists, a systematist emeritus, three museum technicians, a scientific illustrator, and a secretary. The systematists include Drs. Bruce B. Collette and Thomas Munroe as ichthyologists, Dr. Michael Vecchione as a malacologist specializing in squids, and Drs. Austin Williams and Isabel Pérez Farfante as decapod crustacean specialists. In addition, we currently have two visiting investigators, one from India, Dr. A. Rajaguru, and one from the NOAA National Undersea Research Program, Dr. David Stein. Last summer we had three summer aides and two student interns, Jason Mezey and Kristina Louie.

A unit of the Northeast Fisheries Science Center, National Marine Fisheries Service, we are located in the National Museum of Natural History, where we can take advantage of one of the world's leading systems of collections, libraries, equipment, and facilities that are designed specifically for taxonomic and systematic research. The opportunity to meet and communicate with other taxonomic experts who reside in or visit the Smithsonian keeps us current on the latest ideas and techniques in the field. As Smithsonian Research Associates, we expand Smithsonian scientific capabilities and help build and curate Smithsonian collections.

The Systematics Laboratory has two major responsibilities, research and service. Our research produces two principal products: 1) worldwide and regional taxonomic monographs, which are scholarly documents that identify, describe, and catalogue the diversity of species within selected taxa of marine organisms of commercial or ecological importance; and 2) various aids to identification. These documents provide the necessary information for non-specialists to recognize and identify marine organisms.

The Systematics Laboratory serves many public as well as private institutions and individuals worldwide by providing expert identifications and information for a diversity of marine organisms including, but not limited to, the groups we study. We also review and comment upon manuscripts for scientific journals and for colleagues in the National Marine Fisheries Service, other agencies, and academia. Our staff evaluates research proposals for the National Science Foundation, Sea Grant, and similar research funding agencies.

In addition to these activities, staff members serve as officers of various scientific associations and participate in university affairs as research associates and adjunct professors.

HISTORY

The origin of the National Systematics Laboratory can be traced back to 15 August 1942, when Samuel F. Hildebrand moved into the Division of Fishes of the National Museum of Natural History to continue his ichthyological research for the Department of the Interior's Bureau of Fisheries; this followed the merger of the Bureau of Fisheries fish collection with that of the U. S. National Museum. The Laboratory, then the National Center for Systematics, was transferred from the Department of the Interior to the National Oceanic and Atmospheric Administration in 1970 and renamed the National Systematics Laboratory. The Laboratory is administered by the Northeast Fisheries Science Center, National Marine Fisheries Service, but also is responsible to the National Marine Fisheries Service Research Council and other regional Fisheries Science Centers.

RESEARCH

Eleven papers by NSL scientists were published in calendar year 1993 (listed at end of this report). Research completed in 1993 and earlier has led to 13 more papers that are now in press. Five additional manuscripts were completed. Major accomplishments in 1993 are listed below for each investigation.

FISHES

Pelagic fishes of great importance to man live in the highly productive surface layers of the ocean where species tend to grow large and range widely. Emphasis is devoted to studying the anatomy and systematics of scombroids, the group that includes the tunas, Spanish mackerels, bonitos, and mackerels.

The giant tunas, bonitos, Spanish mackerels, and double-lined mackerels found around the world have been treated by Dr. Collette and colleagues in a series of monographs and papers. A revision of the frigate tunas of the genus *Auxis*, including descriptions of two new subspecies from the eastern Pacific was completed.

Several other groups of fishes are also under study. These include halfbeaks (Hemiramphidae) and needlefishes (Belonidae), abundant fishes, which are important forage species and are of local importance as food and bait. Monographs on these two families are being prepared by Dr. Collette for the monographic series, *Fishes of the western North Atlantic.*

1. Revision of Fishes of the Gulf of Maine.- A revision of Henry B. Bigelow and William C. Schroeder's classic 1953 volume *Fishes of the Gulf of Maine* is underway by Drs. Bruce B. Collette and Grace Klein-MacPhee. A contract was signed for publication of the revised volume by the Smithsonian Institution Press. Drafts of revised accounts for several sections were produced. Accounts for 170 of the approximately 238 species (71%) have now been written.

2. Halfbeaks and needlefishes.- A paper was published, in collaboration with Heidi Banford, a graduate student from the Virginia Institute of Marine Science, describing a new species of halfbeak from the Atlantic and Gulf coasts of the United States. This halfbeak is the most commonly-occurring species along the Atlantic and Gulf coasts of the United States. Another article, completed by Drs. Collette and Parin, a semi-popular account of the group for an Australian encyclopedia of fishes, is in press. Smithsonian summer interns, Jason Mezey and Kristina Louie, worked with Dr. Collette on systematics of the viviparous halfbeak genus *Nomorhamphus*.

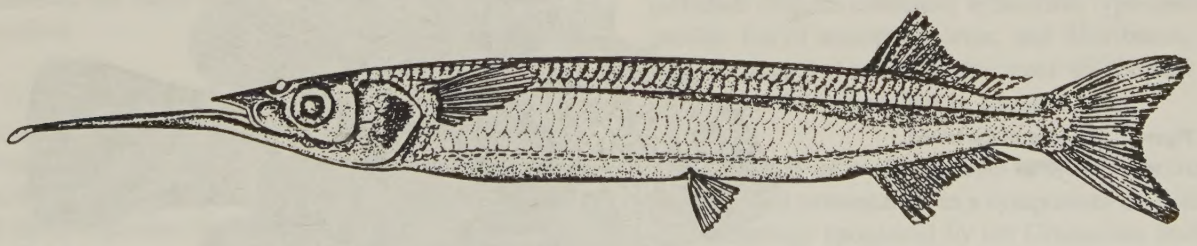

Figure 1. *Hyporhamphus meeki* Banford and Collette, holotype, USNM 294369 (160 mm SL).

3. Tunas and mackerels.- A paper describing a new species of cutlassfish (*Lepidopus*) from the western Atlantic was published with Dr. N.V. Parin, a Russian colleague. This cutlassfish is now known to occur from Nova Scotia and Georges Bank south to southern Brazil at 200-500 meters depth. Progress was also made on completing a revision of the frigate tunas, *Auxis*.

4. FAO.- The Systematics Laboratory continues to support the efforts of international organizations to make the results of systematic research available to a wider audience. Drs. Collette and N.V. Parin (Russian Academy of Sciences) have agreed to produce a world catalogue of beloniform fishes, the flyingfishes, sauries, needlefishes, and halfbeaks, for FAO. Dr. Munroe completed FAO Species Identification Sheets for cynoglossid flatfishes occurring in the eastern Pacific and began work on identification sheets for species of tonguefishes from the western-central Pacific. A third project was begun composing a world catalogue of cynoglossid flatfishes.

5. Tonguefish taxonomy.- Tonguefishes (*Symphurus*) are small to medium-sized flatfishes comprising significant portions of the demersal fish faunas inhabiting sandy and muddy substrates in coastal seas of the New World and are under study by Dr. Munroe. Approximately 30 species of tonguefishes, some of which are important in the by-catch recorded in commercial fishing activities, are currently recognized in the eastern Pacific and western Atlantic. In 1993, a paper describing the first recorded occurrence of reversal in a deepwater tropical species of eastern Atlantic tonguefish was accepted for publication. Two new species of deepwater tonguefishes are included among the species studied. In 1993, identification sheets for the 17 species of tonguefishes of the genus *Symphurus* occurring in the eastern Pacific, in collaboration with an FAO sponsored project, was completed and the manuscript is now in press. A draft paper of a systematic revision of 24 western Atlantic species of *Symphurus* was also completed in 1993. This paper provides keys for identification, updated synonymies, redescriptions, and summaries of ecological information for all species occurring in the western Atlantic ocean.

6. Tautog biology.- A paper describing the results of the first age-growth study of tautog from southern regions of the species' geographic range were reported in a paper co-authored by Dr. Munroe and published in the *Fishery Bulletin*. Tautog off Virginia are long-lived (+25 yrs) and attain relatively large sizes (672 mm TL) slowly. Growth rates of both sexes were similar, and sexual maturity occurs at age-3 in both sexes. Recommendations were made to assist fishery managers when considering options to maintain or improve stocks of this species.

7. Clupeoid fishes identification project.- A large collection of clupeoid fishes from the NMFS laboratory in Honolulu was conveyed to the Systematics Laboratory for transfer into the National Fish Collection. To date, over 9,000 specimens representing seven genera and 11 species of clupeids have been sorted, identified, and catalogued into the USNM fish collection.

8. Antarctic Liparididae.- Dr. David Stein, Biology Program Director, National Undersea Research Program, in part-time residence at NSL, continued his taxonomic studies on Antarctic Liparididae, with funding from the National Science Foundation which was transferred to NSL. Progress was made on a manuscript reviewing southern ocean liparids. Much effort was devoted to a revision of Antarctic liparids of the genus *Caroproctes*.

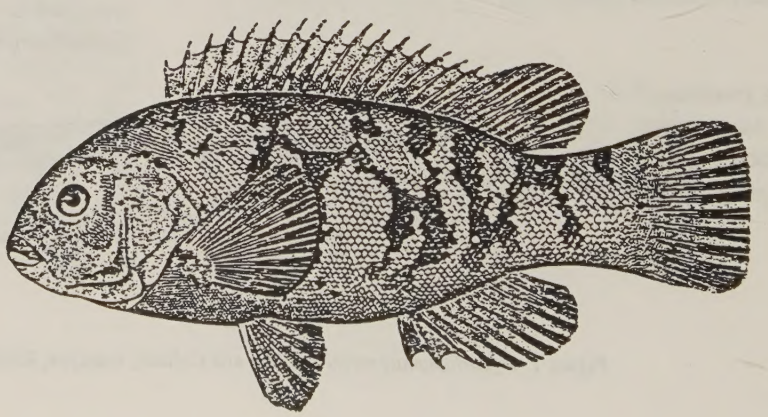

Figure 2. Drawing of the tautog, *Tautoga onitis*.

CRUSTACEANS

The groups of crustaceans most directly important to fisheries are the shrimps (mainly penaeoid species), lobsters, and crabs. Research on shrimps in the National Systematics Laboratory is conducted by Dr. Isabel C. Canet (Pérez Farfante), and that on crabs, lobsters, and other decapods by Dr. Austin B. Williams.

The shrimp fishery is the most valuable single segment of the U.S. fishing industry. In 1993, domestic commercial landings amounted to 292.9 million lbs (heads-on-weight) with an ex-vessel value of $412,896,000, and an additional 601 million lbs (heads-off), with a value of $2,169,581,000, were imported. To satisfy this great demand, more species have been added to the list of commercially valuable shrimps during the last few years, and new beds have been exploited both in nearby and distant regions, in both shallow and deep waters. Wise management efforts and meaningful ecological and physiological studies require thorough knowledge of the systematics of these crustaceans.

Crabs and lobsters are among the most conspicuous animals in catches from heavily fished marine waters of the world. In U.S. domestic landings, they yield in combination about half of the tonnage of domestic crustacean fishery production and nearly half of its dollar value. In their adult phase they are prominent members of bottom communities, ranging from marshlands and estuaries through nearshore systems to the deep sea, and occupy dominant positions in the biological communities where they live. A huge literature exists for some species that are seemingly well known, but because of faulty oversimplified descriptions and distribution ranges, community relationships of many such species may be poorly understood. Still other species have been uncritically identified, and many have never been recognized and described.

1. Mud shrimps of the western Atlantic.- A monograph on mud shrimps, Upogebiidae, of the western Atlantic has been published. Study of specimens collected by recent oceanographic workers, and those deposited in research collections of museums of the western hemisphere and Europe, shows that 24 species occur in the region. Twelve of these are new to science, including one new genus. Descriptions, illustrations, keys to identification, distribution, and relationships of the fauna to that in other regions are discussed by Dr. Williams in a paper published this year.

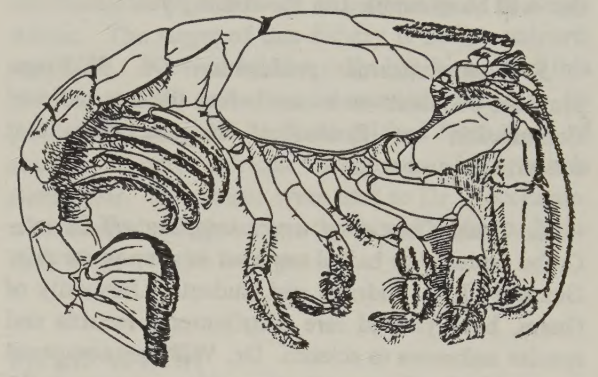

Figure 3. *Upogebia affinis* (Say), USNM 31289; animal in lateral view.

2. The penaeidean decapod crustaceans: keys and diagnoses to the families and genera.- Dr. Isabel Pérez Farfante and Dr. B. Kensley of the Department of Invertebrate Zoology in the Smithsonian Institution National Museum of Natural History are collaborating on a systematic revision and catalogue of penaeidean shrimps. This project is nearing completion. The Glossary, Systematic Section and Bibliography are complete, and work is now progressing on the last section, viz. relationships within the group. Character-matrices are being developed, and cladistic analyses using PAUP and HENNIG86 are being run. Illustrations for about 40 genera have been completed. A further 20 are still needed. For each of about 50 generic-groups to be covered in the catalogue, the following information is included: original reference, synonyms, type-species, gender, list of nominal species, and distribution. It is anticipated that copies of the paper will be sent out for pre-publication review in summer 1994.

3. History of crab research in North America.- From an oral presentation in a symposium on History of Carcinology sponsored by the Crustacean Society during the 1990 meeting of the American Society of

Zoologists, Dr. Williams developed a manuscript entitled "Reflections on crab research in North America since 1758" that was published in a symposium volume.

4. Biology of the American lobster.- Dr. Williams developed a chapter on taxonomy and evolution of the American lobster for a multi-authored book that will be assembled in the coming year.

5. Nomenclatural problems.- Dr. Williams provided comment on a case before the International Commission on Zoological Nomenclature that concerned crustaceans.

6. Crabs from deep water trapping off Guam.- Crabs captured in baited traps set in deep water near Guam by L.G. Eldrege and students, University of Guam, have yielded rare distributional records and species unknown to science. Dr. Williams compared material in the Guam collection with specimens in the Bishop Museum, Honolulu, and in the Queensland and Australian museums, Brisbane and Sydney. He and Dr. Eldredge will present results of the study in a series of papers; the first, now in press, is a description of a new species of spider crab.

7. Submarine-vent crustaceans.- Hydrothermal vents, and cold brine and hydrocarbon seeps in the world oceans, have become major foci of oceanographic discovery and research in the past 15 years. With the aid of increasingly sophisticated exploratory techniques and equipment operated by NOAA and other agencies, these features have come to be recognized as widely associated with tectonically active zones of the ocean floor. The vents and seeps have been in existence since very early in the earth's history, and through geological and biological processes have had profound influence on the oceans. Through time, representatives of many organismic groups have adapted to unique systems of nutrition in these environments at depths beyond the reach of light, and among the groups represented are decapod crustaceans. From the first discovery of these features, Dr. Williams has been describing decapods collected from them. In a paper with Dr. F. C. Dobbs, Department of Oceanography, Old Dominion University, Norfolk, Virginia, Dr. Williams is now describing a new shrimp from hydrothermal vents in Hawaii.

SQUIDS

Cephalopods are very important, both to the marine ecosystem and to humans. They are abundant predators, some of which are large, active, and voracious. Conversely, cephalopods are important prey for many marine mammals, birds, and fishes, including economically important species. Substantial squid fisheries have existed in North America almost exclusively to provide bait for other fisheries. Cephalopods are also important as food for people in many parts of the world. Furthermore, they are important in biomedical research; much of what is known about neurophysiology results from experiments with the giant axon of the squid *Loligo*.

Squid fisheries, both in U.S. waters and worldwide, concentrate on species from two families, Loliginidae and Ommastrephidae. In the United States, these fisheries currently are primarily an export industry, although utilization in the United States is increasing.

Loliginids include many species of demersal squids which attain medium to large sizes and which are both common and abundant on continental shelves. The loliginids in U.S. waters include species that are harvested commercially (the long-term potential yield from the east coast U.S. fishery has been estimated at 44,000 tons), but which are quite difficult to identify. Additionally, there are several other species of small loliginids found in U.S. waters. Generic relationships of the species are presently very confused. Five conflicting classification schemes have been proposed, based on single characters, on regional material, or on arguments that have been institutionalized in outdated literature. Because the diverse family Loliginidae is cosmopolitan, the only way to resolve relationships within it adequately is by worldwide systematic review of the taxonomic characters. Dr. Michael Vecchione, together with several colleagues, is reviewing the loliginids.

Commercially and ecologically, the most important ommastrephids in U.S. waters belong to the genus *Illex*. The potential catch of *Illex* in U.S. waters is 30,000 tons. There are four groups of *Illex* in the western Atlantic which are more or less distinct morphologically. It has been proposed that these morphotypes are separate species, although some authors still consider them to be subspecies.

These arguments, based primarily upon preserved specimens, have not fully considered other components of morphological variability (e.g., geographic, seasonal, sexual, ontogenetic). Dr. Vecchione is conducting a study of *Illex* treating several components of variability from fresh as well as preserved material.

1. Volume on Cephalopod Systematics and Biogeography.- Together with Prof. Nancy Voss, University of Miami, and Dr. Ronald Toll, University of the South, Dr. Vecchione is editing a volume on Cephalopod Systematics and Biogeography. The multi-authored volume, which will be published in *Smithsonian Contributions to Zoology*, resulted from a two-week international workshop conducted at George Washington University and sponsored by the Smithsonian Institution.

2. Multi-media data base on deepsea cephalopods.- A multi-media package still under development uses a micro-computer to show data and images of deepsea cephalopods observed in-situ from submersibles. All collection data, e.g., geographic location, depth, etc., form the data base (from which searches can be made) and are linked with images of species from videotape or 35 mm slides. The taxon-based system can serve as a catalogue or key in the laboratory or for observers on-board submersibles or using ROV's. The system was created on an IBM-type micro-computer using dBase files and Asymetrix Toolbook software running under Microsoft Windows.

3. Student research.- Dr. Vecchione is supervising several graduate research projects on cephalopods. Elizabeth Shea's thesis at the College of William and Mary, with the aid of a museum collection of planktonic squids, is examining the heuristic value of the newly established concept of "paralarvae", which includes combined morphological and ecological criteria for determination of life-history stages. Fulvio Zecchini of the University of Pisa, Italy, performed thesis work at the museum on the development of the hectocotylus in *Illex*. Additionally, Kimberly Jackson, an undergraduate at Howard University, studied cephalopod paralarvae from the eastern tropical Pacific.

4. Squid exhibit.- A very large deep-sea squid captured by a commercial fisherman and donated to NMFS is a central part of a new Smithsonian Institution exhibit on squids. The permanent exhibit, which opened in 1994, uses big squids such as *Taningia danae* mentioned above and the giant squid, *Architeuthis*, to teach the public about cephalopods, systematics, and diversity.

5. South African paralarvae.- An important commercial squid fishery has developed in South Africa. The target of this fishery is *Loligo vulgaris reynaudii*. Previously, the early life history of this species could not be determined because its paralarvae could not be distinguished from those of another South African loliginid, *Lolliguncula mercatoris*. Specimens were sent to Dr. Vecchione, who determined characters that could distinguish the early stages of the two species.

FIELD WORK

Biodiversity of shorefishes and reptiles in the Tonga Islands. Dr. Bruce Collette participated in a Smithsonian Expedition to Tonga funded by the National Geographic Society from Oct. 16 through Nov. 25. The primary focus of the expedition was to use SCUBA and rotenone to explore and sample the coastal fish and invertebrate fauna from the intertidal zone down to about 100 feet. All four major island groups were sampled. The overall Tongan shorefish faunas will then be compared with those of Fiji and New Caledonia, which have been sampled previously by Smithsonian ichthyologists as part of a biogeographic study of the southwest Pacific region.

Dr. Austin Williams collected fossil decapod crustaceans from late Cretaceous deposits in South Dakota during July.

Dr. Vecchione participated in an NSF-funded cruise to the spawning area of the ommastrephid squid species *Sthenoteuthis oualaniensis* off Hawaii. He took part in experiments on the artificial fertilization and hatching of eggs in-vitro and the rearing of paralarvae. While there, he collected material from other species for analysis of DNA to determine relationships among decapod cephalopods. He also used a mini-ROV provided by the National Undersea Research Center at University of Connecticut to examine the fauna attracted at night to the lights of a squid-jigging ship.

BIODIVERSITY

During the year, NSL staff spent a lot of time and effort on marine biodiversity, planning and participating in a wide array of meetings and workshops.

1. International Workshop on Biodiversity Survey, Inventory and Data Management. Responding to a commitment made at the 1992 Earth Summit in Rio de Janeiro, the U. S. government sponsored this international workshop at the Smithsonian Institution Jan. 11-15. The group addressed the technical elements for establishing a framework to inventory and survey the worlds biological diversity and manage the resulting data. A panel of over 40 scientific experts, including Dr. Collette, plus 60 representatives from governments, NGOs, and the press observed the proceedings.

2. NOAA Marine Biodiversity Action Plan. NOAA Line and Program representatives, including Drs. Collette and Vecchione, worked with the NOAA Chief Scientist's Office to develop this action plan. The plan is the first step in developing NOAA's marine biodiversity agenda. It was developed in March and circulated to the NOAA Line Offices for approval in April.

3. NSF Marine Biological Diversity & Systematics Workshop. A group of 30 scientists, including Dr. Collette, from government and academia was invited to the workshop in Denver, CO March 28-29. The goals were to develop the research rationale for and to define the nature of an NSF initiative on marine biodiversity and systematics. The report of the workshop has been issued as BIOMAR.

4. Marine Biodiversity and the Ocean Environment Planning Meeting. This meeting was sponsored by the Ocean Studies Board of the National Research Council and was held in Irvine, CA April 5-6. Twenty scientists from academia and the federal government, including Dr. Collette, met to determine if an interagency initiative in marine biodiversity was warranted, to begin to describe what an initiative might contain, and to describe how such an initiative might be developed. This meeting led to plans for subsequent meetings in 1994.

5. FY 95 NOAA Budget Initiative. Dr. Collette was asked by NOAA to put together a Marine Biodiversity Team from all interested NOAA Line and Program offices. A series of meetings resulted in a Marine Biodiversity Initiative. NOAA management decided to combine the biodiversity inititative with, first the Protected Species initiative, and then, the Coastal Ecosystems Health initiative. Presentation of this initiative was made on May 21.

6. Ocean Resources Committee, Western Legislative Conference. Dr. Collette was invited to address the Ocean Resources Committee in Las Vegas in Sept. He presented an overview of marine biodiversity and NOAA's plans for future work in the area. Several state representatives and assembly members were particularly supportive of efforts to learn more about marine biodiversity and to preseve significant segments of it.

7. Taxon Protocol Committee. NSL formed this committee in Nov. with representation from Smithsonian Institution systematists as well as those from the NSL. We are concerned about the taxonomic credibility of scientific names that will form a National Marine Biodiversity Database (NMBD). The goal of the committee is to establish standards that will inform users of the database of the state of knowledge about a particular species or group of organisms. Just as the Weather Service places a level of probability on its forecasts, we hope to place a level of believability on the components of the NMBD.

8. Coastal Ecosystem Health. A long series of meetings throughout the year involving Drs. Collette and Vecchione led to a planning meeting for NOAA internal and external science reviews of the Coastal Ecosystem Health program on Dec. 16. The marine biodiversity elements put together by Drs. Collette and Vecchione and their NOAA Marine Biodiversity Team were included in the Coastal Ecosystem Health initiative.

SCIENTIFIC ILLUSTRATION/ TRANSLATION

1. Illustrations of fishes, crabs, and cephalopods, drawn by Ms. Keiko Moore, Scientific Illustrator, appeared in several papers published by laboratory scientists in 1993. Ms. Moore's major collection of 220 drawings was included in the monograph on mud shrimps prepared by Dr. Williams and published by Smithsonian Institution Press.

2. Ms. Moore's scientific illustration "*Daector quadrizonatus*" (a venomous toadfish) was added to the permanent exhibit of scientific works displayed at the Library in the Smithsonian Institution's Museum of Natural History. Featured works are those of natural history illustrators in residence at the Museum of Natural History.

3. Ms. Moore continued to translate scientific papers, mostly from Japanese (less often, Chinese), for Systematics Laboratory scientists, and Smithsonian scientists and librarians. Additionally, Ms. Moore serves as an interpreter and guiding official for visitors to the Systematics Laboratory and the National Museum of Natural History from Japanese museums and universities.

SERVICE

In addition to their research responsibilities, scientists from the Systematics Laboratory serve the scientific community and the public in other ways. The primary service functions of this Laboratory are to provide expert identifications for groups of fishes, crustaceans, and squids in which we specialize, and to furnish information on these animals. We assist visitors in the use of the national collections. We review manuscripts for scientific publications, for colleagues in NMFS, and other agencies. Finally, we assist staffs of the divisions of Fishes, Crustacea, and Mollusks of the National Museum of Natural History with curation and loans, especially material collected by NMFS.

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Atlantic Monthly Magazine, Boston, MA	C. Kummer
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NMFS Office of Constituent Affairs	R. Renaldo
NMFS Office of Research, Silver Spring, MD	W. Phoel
NEFSC-RPAC	G. Grice, R. Theroux
NMFS-SEFSC	W. Richards
NMFS, SWFSC, La Jolla, CA	G. Walters
NMFS, SWFSC, Honolulu Laboratory	G. Boehlert
NMFS Trade and Industrial Services	T. Ellington
NOAA	D. Weidner, N. Ostenso, B. Hooke, D.Wieting
NOAA Office of Intergovernmental Affairs	S. Weaver
NOAA Corps	S. Covolas
NOAA-NURP	D. Stein
NOAA Office of Chief Scientist	D. Wieting
New England Aquarium	G. Stone
North Carolina State University	W. Gibson
Old Dominion University, VA	R. Birdsong, J. Holsinger, T. Rach, C. Jones, C. Lascara
Private Citizens	P. Rowe, C. Harmer, J. McFall, C. Moukoury, G. Powell, B. Graham, W. Stein
Rosenstiel School of Marine and Atmospheric Science, University of Miami	M.J. Beth, C. R. Robins
Russian Academy of Sciences	N.V. Parin
Rutgers University	T. Shank
Seafood Dealer, Managua, Nicaragua	S. Campos, H. Mayorga
Smithsonian Institution (SI)	W. Binder, C. Adams, S. Boa, J. Johnson, J. Tyler, M. Hauseman, J. Maret
SI-National Museum of Natural History	D. Appleman
SI-Office of Environmental Awareness	J. Kohl
SI-PAEC	D. Appleman
SI-STRI	E. Benningham
SI-SERC	J. Thomas
South African Sea Fisheries Research Institute	H. Verhyi
SUNY, Stony Brook, Long Island, NY	S. Bauer
Systems Integration Company, Arlington, VA	B. Fagan
US Air Force Academy, Colorado Springs, CO	W. Fisher
US Customs, NY	T. Brady
US Department of Agriculture	B. James
US Department of Defense	E.B. Hostetter
US Department of the Navy	B. Montgomery

US Fish and Wildlife Service
US Food and Drug Administration

Universidade de Lisboa, Portugal
University of Aberdeen, Scotland
University of Chicago
University of Colorado Museum
University of Delaware
University of Florida
University of Hawaii at Manoa
University of Maryland, College Park, MD
University of Michigan
University of Mississippi
University of New Brunswick, Canada
University of Puerto Rico, Mayaguez
University of Rhode Island
University of Southwestern Louisiana
University of Toronto
Virgin Islands Fish and Wildlife
Virginia Institute of Marine Science
Virginia Marine Products Board, Newport News
Virginia SaltWater Fishing Tournament
World Wildlife Fund

MANUSCRIPTS REVIEWED

Reviews of 29 manuscripts were provided for:

Annals of the Cape and Provincial Museum
Annals of the Carnegie Museum
Australian Journal of Marine and Freshwater Research
Bulletin of Marine Science
Estuaries
Fisheries Research
Fishery Bulletin, U.S.
Gulf Coast Fisheries Institute
Journal of Paleontology
Marine Biology
Memoirs of the National Museum of Victoria
Memoirs of the Paris Museum
Molecular Phylogenetics and Evolution
National Geographic Research and Exploration
Proceedings of the Biological Society of Washington
Proceedings of the Fourth International Workshop on Lobster Biology
Veliger
Zoo Biology

35 manuscripts were also reviewed for authors at their request.

R. McDiarmid
M. Meltzer, L. Branch, S. Causey, S. Randolph, A. A. Montgomery, T. Brady
L. Saldanha
C. Martins
B. Block

K. Price
D. Canfield, Jr.
D. Greenfield
F. Alvarez
G.C. Mayer
G. Gaston
F. Marques
D. Hensley
W. Macy, R. Wahle
G. Dauer
J. Ackerman
H. Dickson
H. Banford, J. Boom, A. Adams
V. Liscum

C. Bain
L. Wolfbein

RESEARCH PROPOSALS REVIEWED

21 proposals were reviewed for the following organizations:

Centro Inv. Crezt, Ensenado, Mexico
National Geographic Society
National Academy of Science
National Science Foundation's Program for Systematic Collections
National Science Foundation's Program for International Studies
National Science Foundation's Programs in Systematic Biology and Ecological Studies
NOAA-NURC, Wilmington, NC
NOAA Saltonstall-Kennedy
Smithsonian Institution, Biodiversity Initiative
Smithsonian Institution, Museum of Natural History Reorganization Plan
Smithsonian Institution Postdoctoral, Predoctoral, and Short-Term Visiting Scientist Fellowship Programs
U.S. Forest Service, Grasslands
Whitehall Foundation, Inc.

AMERICAN FISHERIES SOCIETY

Dr. Williams served as a member of the American Fisheries Society Committee on Names of Aquatic Invertebrates.

AMERICAN LITTORAL SOCIETY

Dr. Collette continued to serve on the scientific advisory council.

AMERICAN SOCIETY OF ICHTHYOLOGISTS AND HERPETOLOGISTS

Drs. Collette, MacPhee, Munroe, Mr. Aadland, and Ms. Loffler attended the annual meeting held at the University of Texas, Austin, in June. Drs. Collette and Munroe participated in the Board of Governors and Business meetings. Drs. Collette and MacPhee presented a poster on the revision of the revised edition of Bigelow and Schroeder's "Fishes of the Gulf of Maine". Drs. Collette and G. Helfman presented a second poster on development of an ichthyological textbook. Mr. Aadland presented a paper, co-authored with Dr. Collette, on a revision of the frigate tunas, *Auxis*. Dr. Munroe presented a paper, co-authored with Ms. Nizinski, on a systematic revision of Indo-Pacific *Symphurus*.

BIOLOGICAL SOCIETY OF WASHINGTON

Dr. Williams served as a member of the Council and continued as Custodian of Publications. Dr. Collette attended the annual meeting and council meeting. Dr. Munroe continued as Assistant Editor for Vertebrate Zoology.

CANADIAN DEPARTMENT OF FISHERIES AND OCEANS

Dr. Vecchione presented a seminar on in-situ observations of cephalopods in August.

CENTRAL INTELLIGENCE AGENCY

Ms. Moore's art works were among those included in the Asian Exhibit held at the Central Intelligence Agency in McLean, Virginia, for the month of May.

CEPHALOPOD INTERNATIONAL ADVISORY COUNCIL

Dr. Vecchione continued to serve as an elected member of the council.

CYBIUM

Dr. Collette continued as a member of the Editorial Board of this French ichthyological journal.

FISHES OF THE WESTERN NORTH ATLANTIC

Dr. Collette continued to serve as Chairman of the Editorial Board.

FOURTH INDO-PACIFIC FISH CONFERENCE, BANGKOK, THAILAND

Dr. Collette attended the meeting and presented a paper on a new genus of halfbeaks from Sulawesi. He also assisted FAO in soliciting contributions to the planned species identification sheets for the West Central Pacific.

GEORGETOWN UNIVERSITY

In April, Ms. Moore presented a lecture and demonstrated the making of Japanese woodblock prints for the Washington Print Club at Georgetown University.

INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA (ICES)

Dr. Vecchione served as an official United States member of the Working Group on Squid Biology. He attended the ICES Statutory Meeting in Dublin, Ireland, and participated in deliberations of the Working Group in Cork, Ireland.

INTERNATIONAL SENCKENBERG SYMPOSIUM, CRUSTACEA DECAPODA

Dr. Williams was invited to attend this conference held at Frankfurt a.M., Germany, in October, to present a paper on speciation and biogeography of the crab family Latreilliidae in the Conference session on evolution and phylogeny, and to chair the Conference session on zoogeography and faunistics. The paper, in two parts, is planned for publication in the conference proceedings and in the Bulletin of Natural History, Paris Museum. Study in crustacean research collections in the Senckenberg Natural History Museum, Bavarian State Museum of Geology and Paleontology, Munich, and the Natural History Museum, London, was carried out after with the meeting.

MARYLAND STATE GOVERNMENT

Ms. Moore participated in meetings held monthly during March-May as a member of the Asian Arts and Cultural Committee of Maryland's Governor Shaeffer's Asian American Advisory Committee.

SMITHSONIAN INSTITUTION

Drs. Collette and Munroe served as Research Associates in the Department of Vertebrate Zoology, Drs. Canet, Williams, and Vecchione in the Department of Invertebrate Zoology.

Dr. Collette served as advisor for two Smithsonian Summer Interns, Jason Mezey and Kristina Louie. Dr. Vecchione served as co-advisor with Dr. Clyde Roper of the Smithsonian for Minority Intern, Kimberly Jackson of Howard University.

Dr. Williams served as Representative on the Senate of Scientists for affiliated agencies in NMNH, and as Editor for manuscripts submitted to *Smithsonian Contributions to Zoology* for the Department of Invertebrate Zoology.

Ms. Moore co-organized the Asian Cultural Festival held in the Rotunda of the Natural History Museum. Participating were members of the embassies of Thailand, Philippines, and Indonesia, and the Japanese Ikebana Society.

From October to December, Ms. Moore exhibited her art works at the Meredian House International Center in Washington, DC, in conjunction with the Smithsonian Institution's lecture series in International Studies, "East Asia: Moving Center Stage." Ms. Moore taught a class on the making of Japanese woodblock prints at the Maryland College of Art (Smithsonian Institution) during fall semester. Ms. Moore continued to serve as a Program Assistant Coordinator of Smithsonian's Asian Pacific American Heritage Committee which organizes the annual Asian Pacific American Heritage month-long celebration.

Dr. Vecchione presented a seminar on Cephalopods, submersibles, and systematics to scientists and staff at the Conservation Research Center, Front Royal, in March.

TRINITY COLLEGE, DISTRICT OF COLUMBIA

Ms. Moore was interviewed by a graduate student for inclusion in her thesis on American working women.

UNIVERSITY OF CALIFORNIA AT BERKELEY

Ms. Moore was selected to submit art works and a statement of her philosophy of art to the Department of Asian American and Ethnic Studies, for the forthcoming book "Vision of Fierce Dreams" to be published in 1994 by Temple University Press.

VOPROSY IKHTIOLOGIYA

Dr. Collette was named to the editorial board of this Russian ichthyological journal.

WALTERS ART GALLERY

In October, Ms. Moore demonstrated and gave workshops in the making of Japanese woodblock prints for adults and children as part of the Asian Culture Festival at the Walters Art Gallery in Baltimore.

ZOOLOGICAL INSTITUTE, ST. PETERSBURG, RUSSIA

Dr. David Stein traveled to the museum at the Zoological Institute to work with Russian collaborator Dr. Anatoly P. Andriashev on Antarctic liparids of the genus *Caroproctes*.

OTHER MEETINGS ATTENDED

American Association for Zoological Nomenclature
American Fisheries Society, Annual Meeting of Committee on Common Names of Aquatic Invertebrates
Crustacean Society
International Council for the Exploration of the Sea, Statutory Meeting and European Squid Fishing Project
International Workshop on Biological Inventories and Surveys
National Marine Fisheries Service Publications Advisory Committee
Northeast Fishery Science Center, National Marine Fisheries Service, Fishery Statistics Annual Meeting
National Museum of Natural History, J. L. Barnard Memorial Symposium
Smithsonian Institution Biodiversity Meeting
Smithsonian Institution Exhibits "Ocean Planet" Discussion and Giant Squid Exhibit
Smithsonian Institution, National Museum of Natural History, Marine and Terrestrial Biodiversity Task Force Organizational Meetings
Smithsonian Institution Senate of Scientists

UNIVERSITY AFFAIRS AND TEACHING

BERMUDA BIOLOGICAL STATION

Dr. Collette taught a four-week course, "Biology of Fishes", to a class of 10 students at the Bermuda Biological Station.

CREATIVE AND PERFORMING ARTS MAGNET SCHOOL, PRINCE GEORGES COUNTY, MARYLAND,

Three of Ms. Moore's scientific illustrations of fishes were on the "Showcase Exhibit" at the school during the spring semester.

HARVARD UNIVERSITY

Dr. Collette was reappointed as Research Associate in the Department of Ichthyology, Museum of Comparative Zoology.

NORTHEASTERN UNIVERSITY

Dr. Collette was reappointed as Adjunct Professor of Biology.

VIRGINIA INSTITUTE OF MARINE SCIENCE/ COLLEGE OF WILLIAM AND MARY

Dr. Collette continued as a member of the Associate Faculty and participated in committee meetings for Heidi Banford on her thesis project on halfbeak systematics and for Dan Scoles on his dissertation project comparing genetic variation in yellowfin tuna and chub mackerel.

Dr. Munroe served as a member of the Associate Faculty and served on the Ph. D. dissertation committee of Rogerio Texeira on reproduction and feeding strategies of several species of western Atlantic pipefishes (*Syngnathus*: Syngnathidae). He is also directing research of two Master's degree students, Mr. Geoffrey White who is studying reproductive biology of tautog, and Mr. Mark Terwilliger who is investigating life history and ecology of blackcheek tonguefish in Chesapeake Bay.

Dr. Vecchione served as a member of the Associate Faculty and served as thesis advisor for two Master's degree students working on cephalopods.

WAKEFIELD HIGH SCHOOL, ALEXANDRIA, VIRGINIA

Dr. Williams served as a judge for zoological entrants in the District Science Fair, Wakefield High School, Alexandria, Virginia.

NATIONAL SYSTEMATICS LABORATORY PUBLICATIONS, 1993

Banford, H.M. and B.B. COLLETTE. 1993. *Hyporhamphus meeki*, a new species of halfbeak (Teleostei: Hemiramphidae) from the Atlantic and Gulf coasts of the United States. Proc. Biol. Soc. Wash. 106(2):369-384.

COLLETTE, B.B. 1993. Review: Systematics, Historical Ecology, and North American Freshwater Fishes, Richard Mayden, (ed.). Syst. Biol. 42(3):398-402.

COLLETTE, B.B. 1993. Natural reserves, inventories, and biodiversity. Assoc. Syst. Coll. Newsletter 21(1):6-7.

COLLETTE, B.B. (ed.). 1993. National Systematics Laboratory 50 year bibliography (1942-1992). Natl. Syst. Lab., 26 pp.

Hostetter, E.B. and T.A. MUNROE. 1993. Age, growth, and reproduction of tautog, *Tautoga onitis* (Labridae: Perciformes) from coastal waters of Virginia. Fish. Bull., U.S. 91(1):45-64.

LOFFLER, D.L. and M. VECCHIONE. 1993. An unusual squid paralarva (Cephalopoda) with tentacular photophores. Proc. Biol. Soc. Wash. 106(3):602-605.

Parin, N.V. and B.B. COLLETTE. 1993. Results of the research cruises of the FRV "Walther Herwig" to South America. LXIX. *Lepidopus altifrons*, a new species of cutlassfish (Pisces, Scombroidei: Trichiuridae) from the western Atlantic Ocean. Arch. FischWiss. 41(3):187-195.

Roper, C.F.E. and M. VECCHIONE. 1993. A geographic and taxonomic review of *Taningia danae* Joubin, 1931 (Cephalopoda: Octopoteuthidae), with new records and observations on bioluminescence. pp. 441-456 In: Okutani, T., R. K. O'Dor, and T. Kubodera (eds.). Recent Advances in Cephalopod Fisheries Biology. Tokai Univ. Press, Japan.

WILLIAMS, A.B. 1993. Comments on the proposed conservation of the specific names of *Gebia major capensis* Kraus, 1843 and *G. africana* Ortmann, 1894 (currently *Upogebia capensis* and *U. africana*; Crustacea, Decapoda) by the designation of a replacement neotype for *U. capensis*. (Case 2827; BZN 49:187-190). Bull. Zool. Nomencl. 50(2):143-144.

WILLIAMS, A.B. 1993. Reflections on crab research in North America since 1758. pp.259-273 In (F. Truesdale, ed.), History of Carcinology, Crustacean Issues, Volume 8. A. A. Balkema/Rotterdam.

WILLIAMS, A.B. 1993. Mud shrimps, Upogebiidae, from the western Atlantic (Thalassinoidea: Upogebiidae). Smithsonian Contrib. Zool. No. 544:71 pp.

PAPERS IN PRESS

Carpenter, K.E., B.B. COLLETTE, and J.L. Russo. Unstable and stable classifications of scombroid fishes. Bull. Mar. Sci.

COLLETTE, B.B. *Scomberomorus lineolatus* is a valid species of Spanish mackerel, not an interspecific hybrid. J. Nat. Hist.

COLLETTE, B.B. Families Batrachoididae, Belonidae, Coryphaenidae, Hemiramphidae, Scombridae, and Xiphiidae. FAO Species Identification Sheets, East Central Pacific.

COLLETTE, B.B. and N.V. Parin. Flyingfishes and allies. In: Encyclopedia of Animals: Fishes. J.R. Paxton (ed.). Weldon Owen Publ., Sydney.

Ito, R.Y., D.R. Hawn, and B.B. COLLETTE. First record of the butterfly kingfish *Gasterochisma melampus* (Scombridae) from the North Pacific Ocean. Japan. J. Ichthyol.

MUNROE, T.A. First record of reversal in *Symphurus vanmelleae* (Pleuronectiformes, Cynoglossidae), a deep-water tonguefish from the tropical eastern Atlantic. Cybium.

MUNROE, T.A., F. Krupp, and M. Schneider. Family Cynoglossidae. FAO Species Identification Sheets, East Central Pacific.

Poss, S.G. and B.B. COLLETTE. Second survey of fish collections in the United States and Canada. Copeia.

Sweeney, M.J. and M. VECCHIONE. Generic and specific names introduced in the family Loliginidae. In: Systematics and Biogeography of Cephalopods. N.A. Voss, M. Vecchione and R. Toll (eds.). Smithsonian Contrib. Zool.

VECCHIONE, M. Ontogenetic characters and cephalopod systematics. In: Systematics and Biogeography of Cephalopods. N.A. Voss, M. Vecchione and R. Toll (eds.). Smithsonian Contrib. Zool.

VECCHIONE, M., T.F. Brakoniecki, Y. Natsukari, and R.T. Hanlon. A provisional generic classification of the Loliginidae. In: Systematics and Biogeography of Cephalopods. N.A. Voss, M. Vecchione and R. Toll (eds.). Smithsonian Contrib. Zool.

VECCHIONE, M., C.F.E. Roper, C.C. Lu, and M.J. Sweeney. Development, distribution, and relative abundance of paralarval cephalopods in the western North Atlantic. Smithsonian Contrib. Zool.

WILLIAMS, A.B. Biology of the lobster, *Homarus americanus*. Chapter 2. Taxonomy and Evolution. For: Book edited by J.R. Factor, to be published by Academic Press.

WILLIAMS, A.B. and L.G. Eldredge. A new species of spider crab (Brachuyra: Majidae) from Guam. Crust. Res.

COMPLETED MANUSCRIPTS

Bishop, G.A. and A.B. WILLIAMS. Crabs from the Tepee Buttes of South Dakota and Colorado. For: Proc. Biol. Soc. Washington.

COLLETTE, B.B. and C.R. AADLAND. Revision of the frigate tunas (Scombridae, *Auxis*) with descriptions of two new subspecies from the eastern Pacific. For: Fishery Bulletin, U.S.

Felder, D.L., A.B. WILLIAMS, and J.E. Neigel. Congruence of phenotypic and genetic analyses for stone crabs, *Menippe mercenaria* (Say) from Georgia, USA (Decapoda, Xanthidae). For: J. Crust. Biol.

MUNROE, T.A. Systematics and ecology of tonguefishes (*Symphurus*: Cynoglossidae: Pleuronectiformes) in the western Atlantic Ocean. For: Fishery Bulletin, U.S.

VECCHIONE, M. Systematics, ecology, and the physiological adaptations of cephalopods. For: Mar. Behav. Physiol.

STAFF

Bruce B. Collette	Laboratory Director and Ichthyologist
Isabel C. Canet (Pérez Farfante)	Carcinologist Emeritus
Thomas A. Munroe	Ichthyologist
Michael Vecchione	Squid Biologist
Austin B. Williams	Carcinologist
Grace Klein-MacPhee	Fishery Biologist
Keiko H. Moore	Scientific Illustrator
Virginia R. Thomas	Secretary
Martha Nizinski	Zoologist
Ruth Gibbons	Museum Specialist
Deborah L. Loffler	Museum Specialist
Maureen Aninye	Biological Aide (Temporary)
Alsane A. Soumah	Museum Aide (Temporary)
Elizabeth Keane	Biological Lab. Technician (Temporary)
Christopher Aadland	Museum Specialist (Temporary)
A. Rajaguru	Visiting Investigator
David Stein	Visiting Investigator
Jason Mezey	Smithsonian summer intern
Kristina Louie	Smithsonian summer intern